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(71) Applicants John Anthony Sullivan, 2 Station Road, Cheadle Hulme, Cheshire.
(72) Inventors John Anthony Sullivan
(74) Agents McNeight and Lawrence, Regent House, Heaton Lane, Stockport, Cheshire SK4 1BS.

(54) **Stabilising two-wheeled vehicles**

(57) Two-wheeled vehicles such as motocycles are stabilised by an outrigger 11,11a having ground-engaging and retracted positions and vehicle-speed sensitive means operable to move said outrigger between a ground-engaging and a retracted position. The outrigger may be single or double sided and may have skids or wheels. Such arrangements can help riders to control heavy motorcyles at low speeds and support them while halted.

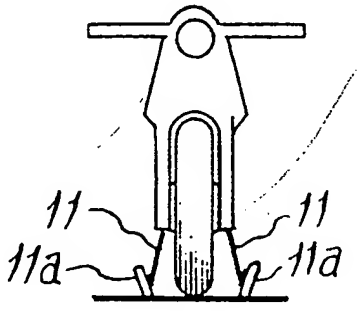

FIG.5

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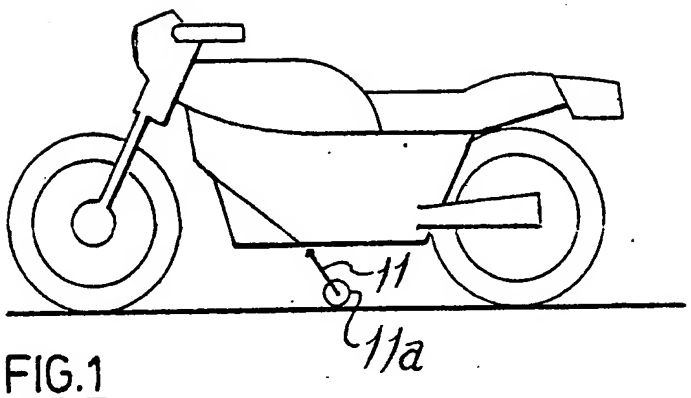


FIG.1

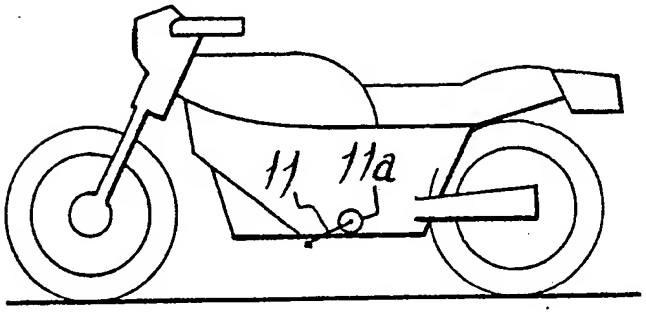


FIG.2

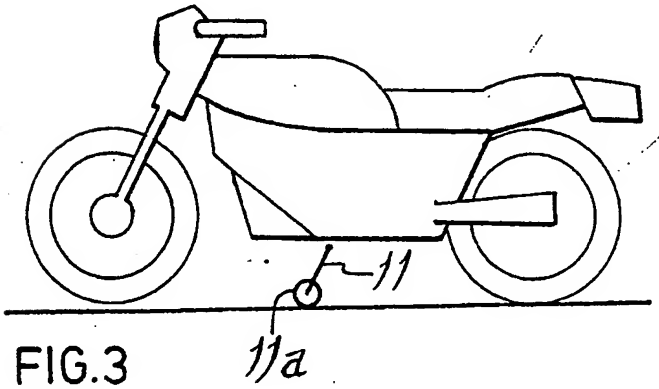


FIG.3

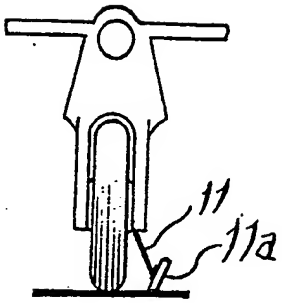


FIG.4

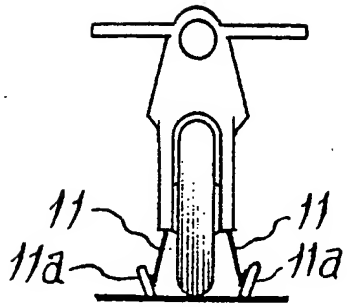


FIG.5

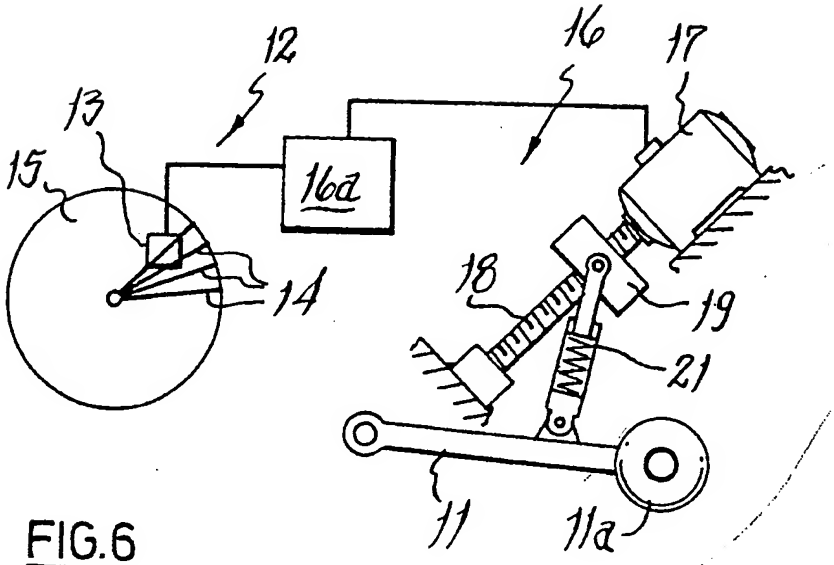
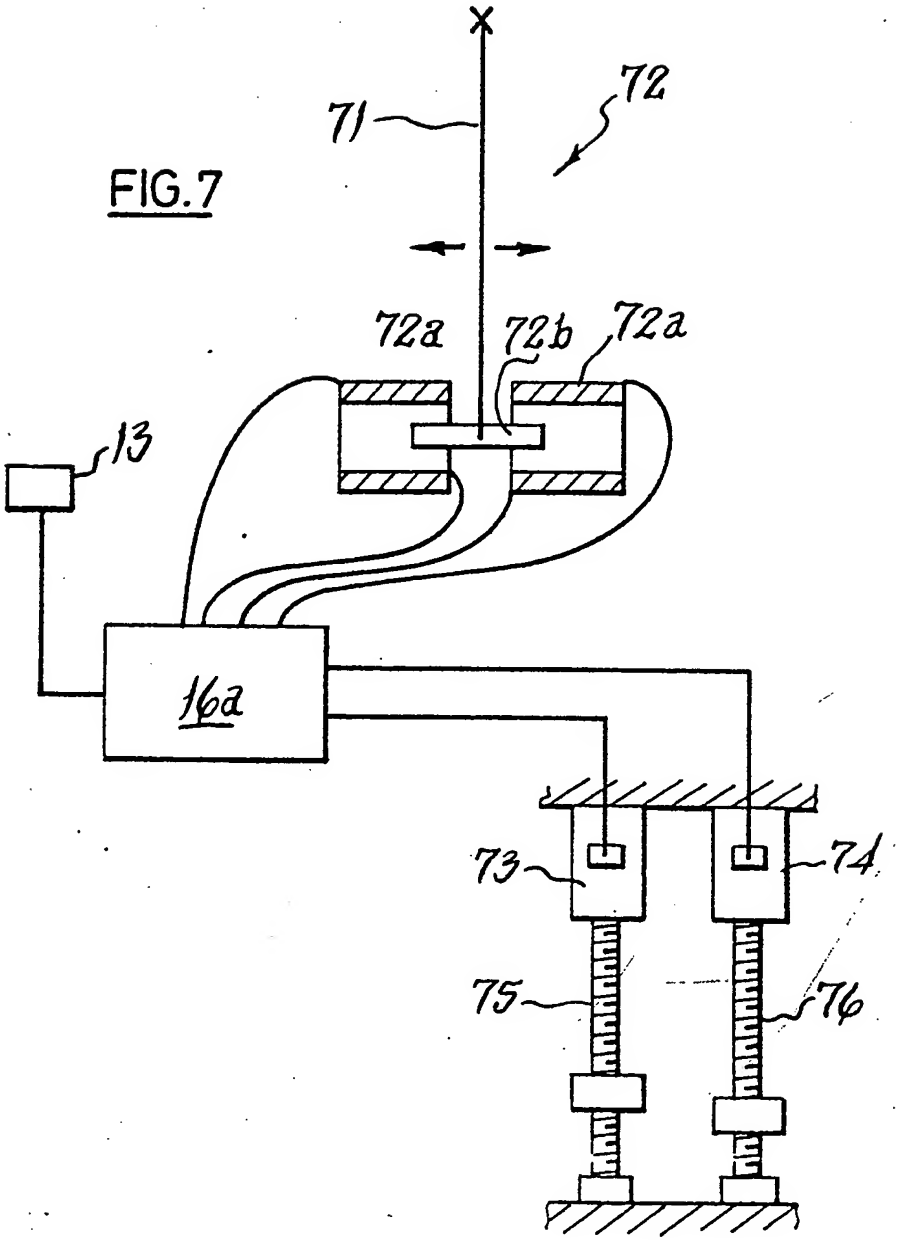


FIG.6

FIG.7



SPECIFICATION

Stabilising two-wheeled vehicles

This invention relates to stabilising essentially two-wheeled road vehicles, such as motorcycles.

When a motorcycle comes to a halt, or starts off from rest, the drive must maintain the machine in an upright position using his leg or both his legs as a prop.

On heavy machines, or machines laden perhaps with a passenger and luggage, this can be a strain on the driver. Moreover, the need so to prop the vehicle may constitute a limitation on the size of motorcycles.

The invention comprises a stabilising system for essentially two-wheeled road vehicles comprising an outrigger having ground-engaging and retracted positions and vehicle-speed sensitive means operable to move said outrigger between a ground-engaging and a retracted position.

Standard equipment on motorcycles (and some pedal cycles) is, of course, the parking prop, which can be lowered manually when the machine is stationary. This, however, is of no use for supporting the machine when it is in or about to be set in motion.

Also available are stabilising wheels on children's bicycles, which are intended to keep them upright while first learning to ride, to be removed completely when they become proficient.

Such fixed stabilisers effectively militate against riding the machine to which they are attached at anything but low speeds, and are never found on motorcycles.

The speed sensitive means may be operable to move said outrigger to a ground-engaging position at a first predetermined speed as the vehicle decelerates and to move it to a retracted position at a second predetermined speed as the vehicle accelerates. The two said speeds may be the same speed, but in any event will be low - say between 2 and 5 miles per hour (say 2.5 and 8 kilometres per hour).

The outrigger may be resiliently urged towards a ground-engaging position.

Although skids might well serve for certain applications, it is envisaged that for ordinary purposes, the outrigger will be equipped with a ground-engaging wheel. This, when the outrigger is in a ground-engaging position, will be on an axis running transversely of the machine but it may also be provided that the outrigger can move to another ground-engaging position in which the wheel axis is inclined to the vehicle axis whereby to act against the vehicle's moving. In this way, the outrigger can serve additionally as the parking prop.

A motorcycle can be equipped with just on outrigger or, preferably, with one either side of its centre-line. The outrigger or outrigg rs can comprise an arm pivoted on an axis in the vehicle such that in a ground-engaging position the arm xtends downwardly, at an angle of about 45° to the ground.

If there is just one outrigger, it will be desirable that it has a lowermost position such that the machine's centre of gravity lies n the outrigger side f its centre-lin . When th re are two symmetrically arranged utriggers, it may b arranged that they t nd to h ld th machine vertically.

If the outriggers ar spring-loaded towards th ground-engaging position, they may be arranged to hold the machine vertically by the differential force arising from the differential extension or compression of the spring-loading means when the machine tilts one way or the other. This will only work perfectly on reasonably level ground, however. A system may be preferred in which a vertical sensor actuates a differential force producing arrangement. This might best be done with hydraulic means for moving the outriggers or electric motor means.

It would be desirable to include a fail-safe arrangement. Clearly it would be dangerous if a malfunction caused the outriggers to be deployed at speed and the system should fail safe in the retracted postion. However, it would also be dangerous, though to a lesser extent, if the outrigger or outriggers were to collapse when deployed if the driver were relying on them, and the system might include a mechanical lock which has to be overcome by the vehicle's going over the second predetermined speed before the system can return to the retracted position. Failure to overcome the lock might then be arranged to sound an alarm and perhaps also limit the speed and/or acceleration of the vehicle.

Embodiments of stabilising systems according to the invention will now be described with reference to the accompanying drawings in which:

Figure 1 is a diagrammatic illustration of a motorcycle with stabiliser in a first position;

Figure 2 is an illustration like Figure 1 with the stabiliser in a second position;

Figure 3 is an illustration like Figure 1 with the stabiliser in a third position;

Figure 4 is a front view of a motocycle with one kind of stabiliser;

Figure 5 is a front view of a motocycle with another kind of stabiliser;

Figure 6 is a diagrammatic illustration of a control arrangement for the stabiliser; and

Figure 7 is a diagrammatic illustration of a further control arrangement.

Figures 1 to 6 illustrate a stabilising system for a motocycle comprising an outrigger 11 having ground-engaging (Figure 1) and retracted (Figure 2) positions, and vehicle speed-sensitive means 12 operable to move said outrigger 11 between a ground-engaging and a retracted position.

The speed-sensitive means 12 comprise a transducer 13 which might be a proximity switch of some kind - say magnetic - sensing the passage of spokes 14 of a wheel 15 of the motorcycle, and actuating means 16, connected to said transducer 13 and arranged to move the outrigg r 11 t a ground-engaging position at a a first predetermined speed - say 2 miles per hour (or 2.5 km/hr) - as the vehicle dec lerates, and to move it to a retracted position at a second predetermined speed - say 5 miles per hour (or 8 km/hr) as the vehicle accelerates from rest. Th difference in these speeds is thought desirable to avoid repeated actuation of the outrigger 11 as th motorcycle is manoeuvred at low speeds, which

might involve passing several times through a speed of, say, 2 miles per hour before finally coming to rest.

The actuating means 16 comprise an electronic unit 16*a* which counts the impulses received from the transducer 13 and divides them by time to give a speed measurement and which energises or de-energises at appropriate moments, according to the speed measured, an electric motor 17 which rotates a lead screw 18. A collar 19 runs on the lead screw 18 and is driven axially thereof as the lead screw rotates in the collar, which is fixed against rotation. Pivoted on the collar 19 is a rod 21 which is telescopic and sprung against lengthwise compression. The other end of the rod 21 is pivoted to the outrigger 11, which is itself pivotally mounted on an axis which is inclined to the fore-and-aft direction of the vehicle and also inclined to the horizontal so that its retracted position can be parallel to the fore-and-aft direction of the motorcycle, but in its ground-engaging position it slopes downwardly and outwardly.

There may be only one such outrigger 11 as illustrated in Figure 4 or there may be two, one either side of the centre-line of the motorcycle as shown in Figure 5. In the latter case, both outriggers may be moved by the same collar on the same lead screw.

If only one outrigger is provided, the vehicle will be arranged to lean over towards it when it is in a ground-engaging position, as shown in Figure 4. If two outriggers are used, the motorcycle can be held in an essentially upright position. On level ground, any tendency to tilt to one side or the other will be countered by an increased pressure from the more compressed spring in the outrigger on that side and a correspondingly reduced pressure in the other spring.

This may well be an adequate arrangement for most motrocycles - after all it will be much better than relying entirely on the driver to keep the machine upright - but means may, if desired, be additionally provided to sense the vertical direction and to cause the outriggers to adapt to it to tend to keep the machine upright even on sloping ground. Such an arrangement comprises a damped pendulum 71 as shown in Figure 7, the position of which relative to the motorcycle is sensed by a suitable sensing device 72 (such as a solenoid 72*a* arrangement with a movable soft iron insert 72*b*). Separate electric motors 73, 74 operate separate lead screws 75, 76 for the two outriggers 11. According to the tilt information input to the control arrangement, one or other of the motors is caused to move its collar further to compensate for unlevel ground and restore the pendulum to a central position relative to the motorcycle.

So that the motorcycle can still move without excessive frictional forces even at the low speeds at which it is envisaged the outriggers will be deployed, they are fitted with small wheels 11*a*.

It can, of course, be arranged that the load the machine is carrying does not affect the manner in which the stabilisers control the position of the machine - this may be effected entirely by the geometry of the system, or it may be effected by special level control arrangements that adapt the ground engaging face of the outriggers to the weight of the vehicle.

There is a third position of the outrigger 11, illustrated in Figure 3, in which the outrigger is moved through its lowermost position - possibly requiring one wheel of the motorcycle to be lifted off the ground - into a parking position. In this parking position, the wheel 11*a* will not be aligned with the fore-and-aft axis of the motorcycle and will effectively act as a brake against movement thereof so that the outrigger or outriggers, if there be two of them, can be used as a parking prop or stand.

In place of the electric motor arrangement described, hydraulic ram means may be used, actuated by solenoid-controlled valve means from a speed-sensing arrangement. Hydraulic pressure can be provided by an engine-driven pump.

In any event, it will be desirable to ensure that the motorcycle cannot collapse when the engine is turned off or that the engine cannot be turned off unless the outrigger is in its parking position.

All of the controls may, of course, be subject to a manual override.

CLAIMS (filed 23rd July 1982)

1. A stabilising system for essentially two-wheeled road vehicles comprising an outrigger having ground-engaging and retracted positions and vehicle-speed sensitive means operable to move said outrigger between a ground-engaging and a retracted position.

2. A system according to claim 1, said speed sensitive means being operable to move said outrigger to a ground-engaging position at a first predetermined speed as the vehicle decelerates.

3. A system according to claim 1 or claim 2, said speed sensitive means being operable to move said outrigger to a retracted position at a second predetermined speed as the vehicle accelerates.

4. A system according to any one of claims 1 to 3 in which said outrigger is resiliently urged towards a ground-engaging position.

5. A system according to any one of claims 1 to 4, in which said outrigger has a ground-engaging wheel.

6. A system according to claim 5, in which said ground-engaging wheel, when said outrigger is in a ground-engaging position, is on an axis running transversely of the vehicle.

7. A system according to claim 6, said outrigger having a vehicle parking position in which said ground-engaging wheel's axis is inclined to the vehicle axis whereby to act against the vehicle's moving.

8. A system according to any one of claims 1 to 7, comprising an outrigger either side of the vehicle axis.

9. A system according to any on of claims 1 to 8, in which the outrigger comprises one arm pivoted on an axis in the vehicle such that in a ground-engaging position the arm extends downwardly at an angle of about 45° to the ground.

10. A system according to any one of claims 1 to

9, including electr nic vehicle sp ed sensing m ans.

11. A system according t any one of claims 1 to 10, comprising hydraulic means for moving said outrigger.

12. A system according to any one of claims 1 to 10, comprising electric motor means for moving said outrigger.

13. A system according to any one of claims 1 to 12, including a fail-safe arrangement.

12. A system substantially as hereinbefore described with reference to the accompanying drawings.

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